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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/779,107	02/08/2001	Paul T. Roshau	GC-431	5680

7590 02/24/2004

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EXAMINER	
ASSOUAD, PATRICK J	
ART UNIT	**PAPER NUMBER**
2857	

DATE MAILED: 02/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/779,107	ROSHAU, PAUL T.	
	Examiner	Art Unit	
	Patrick J Assouad	2857	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *21* is/are allowed.

6)☒ Claim(s) *1-5,9 and 16-20* is/are rejected.

7)☒ Claim(s) *6-8 and 10-15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 June 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. It is noted that Applicant claims priority to a provisional application. See the Oath and pg. 1, lines 5-7 of the instant Specification. However, an application claiming the benefit of a provisional application under 35 U.S.C. 119(e) should not be called a "continuation-in-part" of the provisional application since an application that claims benefit of a provisional application is a nonprovisional application of a provisional application, not a continuation, division, or continuation-in-part of the provisional application. See MPEP 201.08.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-5, 9, and 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Boost et al.** ('425 B1) in view of **Singh et al.** ('988 B1).

4. Note that Figs. 1-2B of **Boost et al.** and Fig. 1 of **Singh et al.** are reproduced below for ease in understanding this rejection. **Boost et al.** disclose:

> A system for monitoring performance of one or more batteries in a battery plant facility. A set of sensors for each battery are used to measure a plurality of battery operation parameters comprising the battery current,

battery voltage, and internal battery temperature of each said battery. A processor generates, for each battery, a plurality of battery status parameters comprising a true age parameter and a float capacity parameter. During a float period, the true age parameter is updated based on elapsed time corrected for battery temperature history and the float capacity is updated based on the most recent true age parameter. During a discharge period, the float capacity parameter is updated based on the evolution of plant voltage during the discharge. After the discharge period, at the beginning of a subsequent float period, the true age parameter is updated based on the float capacity parameter determined during the immediately previous discharge period. (Abstract)

5. Note that in their Background, cols. 1-2, **Boost et al.** are particularly interested in monitoring and maintenance of VRLA or "dry" batteries:

In order to provide services to rural areas, telecommunications equipment is often deployed in small facilities such as cabinets and controlled environmental enclosures, sometimes referred to as outside plant (OP) power system sites. These sites are typically unmanned and remote from the central office (CO). Lead acid "wet" cell batteries are often used in COs but valve-regulated lead acid or "dry" batteries have become the dominant type of battery used at remote OPs, because they are sealed (no water) and have lower maintenance. Such dry batteries also have less power and are typically more expensive than more maintenance-requiring wet cells. A 24-cell dry cell battery typically provides 48V...

In many applications, it is critical that the batteries of the power plant be functional and ready to supply sufficient backup power if AC power is lost. For example, a battery plant may be designed and expected to provide an 8-hour discharge. If, however, the battery has an unknown problem and only lasts one hour when AC power goes out, telephone service may drop out after one hour and may not be restored for the several hours it takes power to be restored. Or, if a battery string is supposed to last a given time (e.g. 20 years) and will normally be replaced at some battery age close to but before the expiration time (e.g., at 19 years), a prematurely aged battery may not be replaced in time (e.g., a battery may have an effective or "true" age of 20 years after only 5 years of service due to various factors such as prolonged high operating temperatures).

Thus, it is important to monitor battery strings of a given battery plant to predict battery failure and other battery performance or status parameters or measures related to battery health or performance, so that action can be taken ahead of time to ensure that the problem is addressed, i.e. to ensure that the battery strings will perform as expected upon loss of AC power and to ensure that the batteries are adequately maintained, inspected, replaced, and the like.

6. **Boost et al.** substantially disclose the instant claimed invention. From at least Figs. 1-2B of **Boost et al.**, we can clearly see the claimed "battery monitor", a "centralized system connecting said battery monitor through an industry standard data system to a central office", an "alarm", and "means for acquiring all data needed...".

7. With respect to the claimed "short-term discharge test", we can turn to cols. 7-8 of **Boost et al.** where we see:

> One of the best indicators of battery health is the actual behavior of the battery during a discharge. Despite the fact that detecting a problem at this point is late, it is quite likely that there will be little change between two consecutive discharges, unless a sudden failure has occurred. Therefore, a discharge (even as little as minutes) provides precious data about what the next discharge will be, if pertinent data was recorded in the processed battery history. Discharges can be natural (i.e. during an AC outage) or forced...
>
> During a discharge period, the battery capacity is continually re-calculated during the discharge for use in the remaining discharge time computation (discussed below). This draws on the fact that the actual behavior of the battery during a discharge is an indicator of battery health. As described in further detail with reference to FIGS. 3-4 and Eqs. 12-14, battery capacity is calculated based on the expected discharge curves for the battery, which is corrected with temperature and rate of discharge. In particular, the evolution of the plant voltage versus cumulated Ah, in comparison to an ideal (and corrected for temperature and discharge rate) is used to calculate the overall plant float capacity, using the most recent float capacity information generated during the last float period as a starting point. Then, based on the relative value of the string currents delivered by each battery string during the first 5% of the discharge, the battery capacity for each battery is extrapolated based on the plant float capacity just calculated.

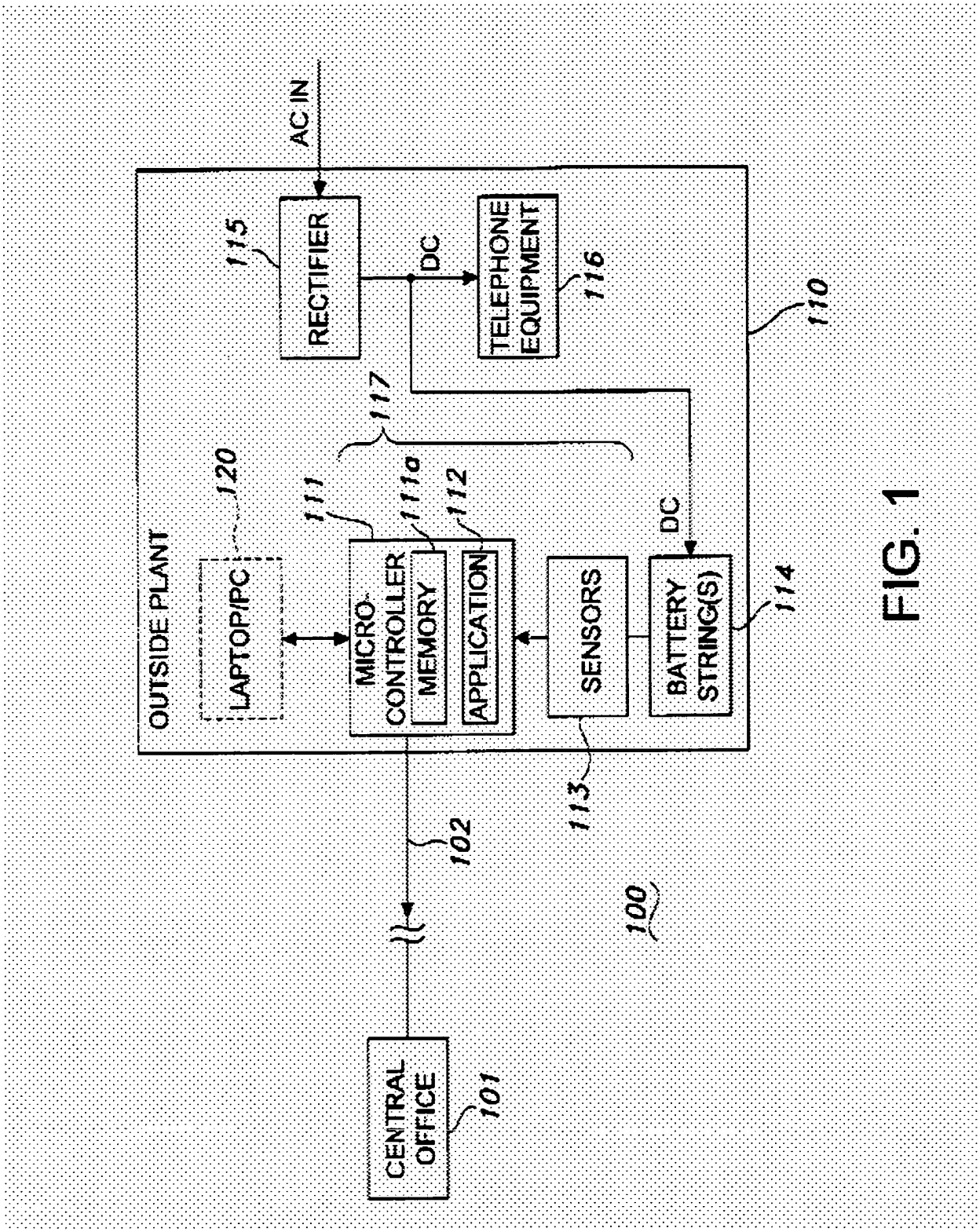
AC IN
RECTIFIER
115
DC
TELEPHONE EQUIPMENT
116
110
117
OUTSIDE PLANT
120
LAPTOP/PC
111
MICRO-CONTROLLER
110a
MEMORY
112
APPLICATION
SENSORS
DC
BATTERY STRING(S)
114
113
102
100
CENTRAL OFFICE
101

FIG. 1

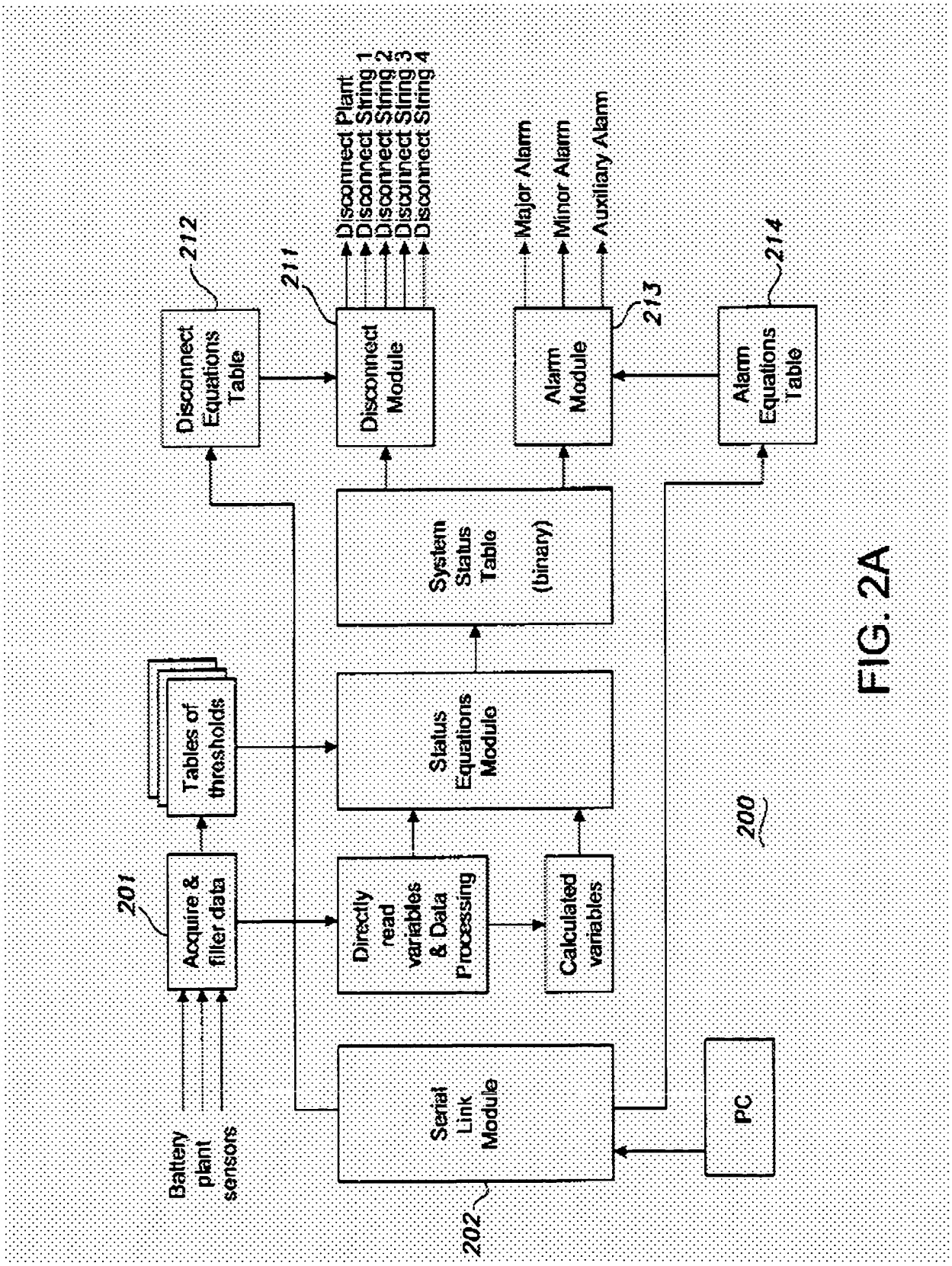
Disconnect Equations Table
212
Disconnect Module
211
Disconnect Plant
Disconnect String 1
Disconnect String 2
Disconnect String 3
Disconnect String 4
Alarm Module
213
Major Alarm
Minor Alarm
Auxiliary Alarm
Alarm Equations Table
214
System Status Table (binary)
Status Equations Module
Tables of thresholds
Acquire & filter data
201
Directly read variables & Data Processing
Calculated variables
200
Serial Link Module
202
PC
Battery plant sensors

FIG. 2A

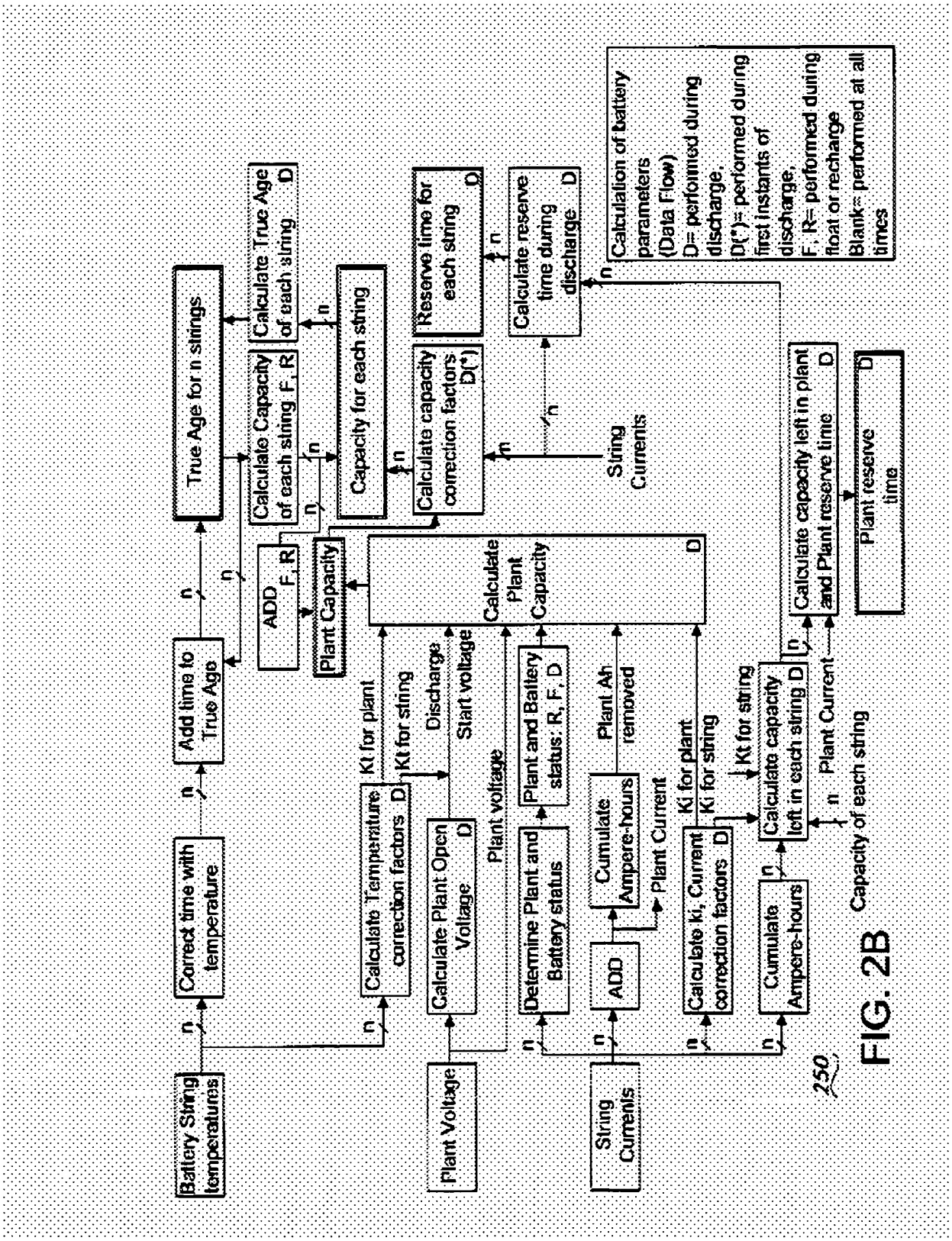
Battery String temperatures
Plant Voltage
String Currents
Correct time with temperature
Add time to True Age
True Age for n strings
Calculate True Age of each string D
Calculate Capacity of each string F, R
ADD F, R
Plant Capacity
Capacity for each string
Calculate Temperature correction factors D
Calculate Plant Open Voltage D
Determine Plant and Battery status
Plant and Battery status: R, F, D
Kt for plant
Kt for string
Discharge
Start voltage
Plant voltage
Calculate Plant Capacity D
Reserve time for each string D
Calculate capacity correction factors D(*)
Calculate reserve time during discharge D
Calculation of battery parameters (Data Flow)
D= performed during discharge;
D(*)= performed during first instants of discharge;
F, R= performed during float or recharge
Blank= performed at all times
Cumulate Ampere-hours
ADD
Plant Ah removed
Plant Current
Ki for plant
Ki for string
Calculate ki, Current correction factors D
Kt for string
Calculate capacity left in each string D
Cumulate Ampere-hours
Capacity of each string
Calculate capacity left in plant and Plant reserve time D
Plant Current
Plant reserve time
250

FIG. 2B

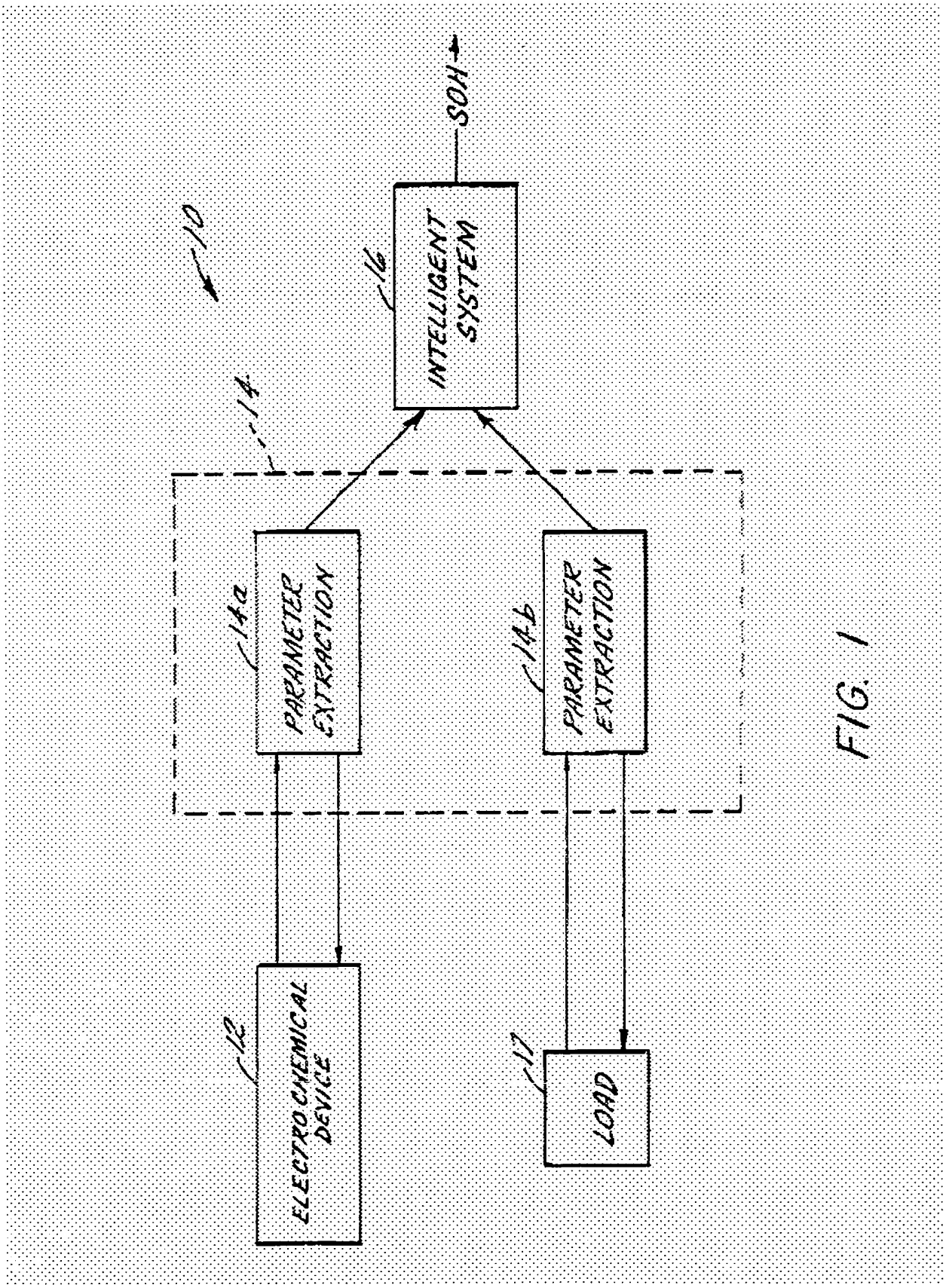
SOH
10
16
INTELLIGENT SYSTEM
14
14a
PARAMETER EXTRACTION
14b
PARAMETER EXTRACTION
12
ELECTROCHEMICAL DEVICE
17
LOAD

FIG. 1

8. The difference between the instant claimed invention (claims 1 and 16) and that of **Boost et al.** lies in the claimed "neural network and fuzzy logic network" which is used for "obtaining a predicted capacity" of the VRLA or "dry" battery.

9. **Singh et al.** disclose :

> A method for determining state of health (SOH) of an electrochemical device using fuzzy logic (i.e., an intelligent system) is presented. State of health of an electrochemical device is determined by an internal characteristic parameter (or external operating and environmental conditions) of the electrochemical device and a characteristic parameter of a load with an intelligent system. The electrochemical device comprises such devices as primary ("throwaway") batteries, rechargeable batteries, fuel cells, hybrid batteries containing a fuel cell electrode or electrochemical supercapacitors. The intelligent system is trained in the relationship between the characteristic parameters of the electrochemical device, the characteristic parameters of the load and the SOH of the electrochemical device.

10. **Singh et al.** also particularly discuss in their Background the need to determine or measure or predict the "state-of-health" (SOH) of VRLA or "dry" batteries. Basically, the intelligent system of **Singh et al.** comprises:

> ...any system that adaptively estimates or learns continuous functions from data without specifying how outputs depend on inputs. By way of example, the intelligent system includes an artificial neural system, a fuzzy system and other such model-free function estimators that learn. Learning, so-called, "tunes" an intelligent system. This learning process (also referred to as a training process) can be implemented in many ways. The intelligent system can be implemented using: an algorithm such as radiant descent and clustering used to tune neural networks and adaptive fuzzy systems; search optimization techniques such as those used by genetic algorithms; or an expert's guesses or trials and errors such as those used in fuzzy expert systems and fuzzy systems.

11. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the "intelligent" or "fuzzy" or "artificial neural

system" teachings of **Singh et al.** into the remote battery plant monitoring system of **Boost et al.** because both **Signh et al.** and **Boost et al.** recognized the need to (remotely) monitor critical back-up (VRLA) batteries, and **Singh et al.** taught us that the well-known non-linear behavior of VRLA batteries may be "learned" by his "intelligent system" and used to montitor and even to ultimately act as a predictor of future battery performance.

12. As per dependent claims 2 and 17 which relate to the voltage and current sensing means, see at least the sensors of Figs. 1-2B of **Boost et al.** As per dependent claims 3 and 18 which relate to the serial port, see at least Figs. 1 and 2a of **Boost et al.** As per dependent claims 4-5 and 19-20 which relate to the real time clock, see at least Figs. 7 and 13 of **Boost et al.**, which show the current (real) time and previous (past) times which of course requires a clock. As per dependent claim 9 which refers to a repeated discharge test, see the aforementioned discussion of repeated (natural or forced) discharging and coincident monitoring of **Boost et al.**

Allowable Subject Matter

13. Claims 6-8 and 10-15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

14. Claim 21 is allowed.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See the attached PTO-892, most notably the IEEE standard and article.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick J Assouad whose telephone number is 571-272-2210. The examiner can normally be reached on Tuesday-Friday, 6:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc Hoff can be reached on 571-272-2216. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Patrick J Assouad
Primary Examiner
Art Unit 2857

pja